

## A PARASITE OF A BIRD'S BRAIN.

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THE functions and diseases of the brain of a bird, in the strictest sense, belong to the comparative anatomist ; but a brain, even though it be a bird's, which tolerates, without apparent harm, a nest of parasites upon and within its substance, cannot fail to have great suggestive interest to the physician, and especially the neurologist.

The *Plotus anhinga*, or Snake-bird, as it is popularly known, is found in the Southern Atlantic and Gulf States. Its habitat is along the rivers, lakes and lagoons, in the waters of which it finds its food. It is of the cormorant family, and an expert fisher, being able to go a long distance under water. Its food, according to Audubon, consists of small fishes, insects, eggs of frogs, crawfish, young alligators, and small water-snakes.

During the winter of 1867, Dr. Jeffries Wyman, of Harvard University, spent the months of February and March on the St. John's River in Florida. In dissecting the snake-bird, he discovered, in seventeen specimens out of nineteen examined, a mass of threadworms, varying from two to fifteen in number, lying between the cerebellum and the skull, and within the folds of the arachnoid and the pia mater.

He found also in the gizzard and stomach a large number of parasites. He says: "While some of them simply adhered to the mucous membrane, others had their heads thrust deeply in, or their bodies were almost concealed by being buried in the gastric follicles. They are about seventeen millimeters in length, and their oviducts contained an abundance of eggs."

Dr. Wyman reported the results of his investigations to the Boston Society of Natural History in October, 1868.

In 1874 Prof. J. W. P. Jenks, of Brown University made

an extended tour through the then wild region of southern Florida, and according to a promise given to Dr. Wyman, made an elaborate search for the parasites in the brain of all the *anhinga* he could shoot. The material thus gathered was presented to Dr. Wyman, who intended to incorporate it in a fuller report the ensuing Fall, but his sudden

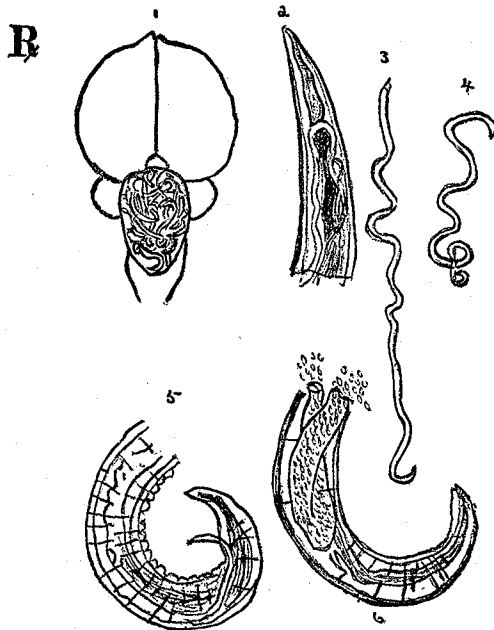


FIG. 1.—Showing relative position of nest of parasites to that of the brain.

FIG. 2.—Head of worm (magnified).

FIGS. 3 and 4.—Female and male thread-worms, twice their natural size.

FIG. 5.—Posterior extremity of male worm, (magnified).

FIG. 6.—Posterior extremity of female worm, showing oviduct distended with eggs, (magnified).

[After Wyman.]

death in September of that year prevented him from carrying out his promise. The report was never made, and so far as I have searched, the report of Dr. Wyman in 1868, and a short note in Prof. Jenks' *Zöology*, comprise all the literature upon the subject published.

But in a letter of Dec. 1st, 1888, Prof. Jenks has very kindly given to me the results of his investigations. He writes :

"As I left Dr. Wyman he enjoined upon me to save all

the brains of the snake-bird I could, and verify or disprove his paper above alluded to. In that paper Prof. Wyman did not attempt any explanation, but simply stated the fact that at least nine out of every ten of the adult *anhinga* had a bunch of parasitic worms, about an inch in length, and to the number of fifteen more or less, coiled together on the top of the brain. As I found them by the hundred in the different rookeries I visited, I not only verified his statement, but also by taking them in all stages of growth, and carefully examining scores of them, I found the half-fledged had no parasitic worm upon the brain, but a few in the stomach, and in those more fully fledged, at different points in the muscles, as though making their way to the brain."

This is a very important observation of Prof. Jenks, and may be found to be the true explanation of how the parasites find their way to the brain. Be this as it may, in the adult bird the parasite is found in no other part of the body except the brain.

Wishing to satisfy myself by a personal examination, I have received from Prof. Jenks the heads of several of these birds and have made a careful study of them. Upon removing the top of the skull, I was struck by the constant appearance of an intensely congested spot of the brain membranes of about half an inch in length and a quarter of an inch in breadth, and occupying a uniform position, so uniform that the skull could be trepanned and the parasites successfully extracted from the living bird.

This position is the central line of the upper surface of the cerebellum, and beginning at the fissure which separates the cerebellum from the cerebrum.

Within this circumscribed area the several thread-worms were found rolled up into a loose ball, and while they could scarcely be described as encysted, still they appeared to be in a condition of harmless inactivity.

The microscope revealed the nature of the parasite to be that of a thread-worm. Both sexes are usually found present in the same nest. They vary from three quarters to one and half inches in length. The female, which is the larger, is frequently found with its oviduct distended with

an enormous number of eggs and hatched young. In view of this great reproductive power of the thread-worm, it becomes an interesting question as to what becomes of this constantly increasing brood, since no more than twelve or fifteen adult worms have been found in the brain at one time.

Dr. Wyman, reasoning from analogy, supposes them to be of a migratory kind, which pass a part of their life in another animal or bird. But this supposition, and it is very probably a correct one, offers no explanation of the manner in which these young parasites find their way out to their future host, for the parasite is never found in any other part or tissue of the bird than the one within the cranium.

Prof. Jenks found repeated evidence of their progress from the stomach to the brain in the half-fledged bird, but never in the adult any similar migration outward.

The most noteworthy feature about this disease is the remarkable tolerance of the brain to the mass of foreign matter compressing its surface. So large is this mass, and so great its pressure that frequently the natural outlines of the cerebellum have been lost owing to the hollow upon its upper surface made by the growing thread-worms.

Küchenmeister, in his "Manual of Animal and Vegetable Parasites," gives a plate illustrating the brain of a sheep suffering from the "staggers."

This intractable disease is due to the presence in the brain or its membranes of a minute cysticercus, sometimes but one, seldom more than three or four, which after wandering around, finally becomes imbedded in or upon the brain mass, and which gives rise to a marked localized inflammation of the structure surrounding it. In the section on Tumors of the Brain and its Envelopes, of Pepper's System of Medicine, Drs. Mills and Lloyd have collected some cases of direct bearing upon the present subject.

After eliminating all the cases of tumor of parts of the brain other than the cerebellum, and also all those which are situate *within* the cerebellar structure, producing by their presence lesions of the organ, there remain three cases, Nos. 73, 74 and 75 of the table, which present points of similarity to the parasitic tumor of the snake-birds brain.

In each of these three cases the tumor was confined to the envelopes of the cerebellum, and the symptoms which finally led to the death of the patients, being produced solely by the mechanical pressure of the foreign growth. The most characteristic symptoms of tumor of the cerebellum were found to be occipital headache, incoordination of muscles, a tremor of limbs, and a staggering gait.

In case 74 the tumor was the size of a hen's egg and lodged between the superior surface of the cerebellum and cerebrum. The most prominent features noticed in this case were violent headaches, gradual loss of sight, anæsthesia and paralysis of left arm and leg, intellect dull, nausea, hiccough, asphyxia by strangulation.

In case 75 the tumor was of the size of a green gage plum, growing from the dura mater of the left side, and by its pressure produced a deep depression in the left lobe of the cerebellum. In this case there were, as in case 74, headache, frequent vomiting, stupor, but, unlike it, was not blind, and had the power to move arms and legs, although the patient could not stand. Died in a convulsion, the right side being the most affected. Thus we find that marked nervous phenomena invariably accompany the presence of the comparatively insignificant cysticercus in the sheep's brain, and equally alarming symptoms are produced by a small tumor, pressing upon the cerebellum of a man, while nineteen out of every twenty snake-birds carry about in their skulls a mass of thread-worms, which, in comparative bulk, would be equal to a handful of large sized angle or fishing worms resting upon a man's brain, and this is done without any apparent disturbance of the functions of the bird, for the snake-bird is the equal of any of the cormorant family in their success in fishing, in their wariness of the hunter, their skill in building their nests and care of their young, and all other social duties which a bird is called upon to perform.

Why is the brain of a bird different from that of a sheep or of a man?

This is one of the instances where reasoning from analogy, based upon comparative anatomy or pathology, would be misleading.